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ABSTRACT

Research was conducted to test the assumption that technical writers compose as other writers do. Information was gathered through questionnaires and interviews surveying 70 writers--technical writing students, students working part-time in industry, university professors, and engineers and researchers working full-time in industry. The results were interpreted as follows: (1) The technical writer does have a composing process of several stages, similar to that of other writers. The subjects all indicated that they spent time prewriting, writing, and revising, with times in each stage dependent on the projected length and the form of the document being written. (2) The composing process of technical writers is reflexive and nonlinear, just like that of other writers. (3) The most experienced technical writers had a range of strategies which they used at each stage in the composing process to help them master writing. (4) Technical composition differs from composing in other fields in that the composing process is more deliberate and strategies more clearly defined: audience, purpose, and form guide planning, writing, and revising. The situational nature of technical writing also influences composition. (RL)

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THE COMPOSING PROCESS OF TECHNICAL WRITERS. A PRELIMINARY STUDY.

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Janet Emig's 1971 study, The Composing Processes of Twelfth Graders, spurred an interest in the writing process: how writers compose rather than simply what they compose. However, a survey of current literature indicates that little has been published on the composing processes of technical writers. Perhaps we have assumed that technical writers compose as other writers do. In order to test this assumption, we conducted the research on which we base this study.

Assessing the Literature

Our first step was to review the literature on the composing process. This literature examines writers from a diversity of disciplines and does not focus upon students or professionals in the pure or applied sciences. From this review, we delineated three areas of general agreement:

1. The composing process is made up of several stages.

For the purposes of discussion, the composing process may be segmented, although researchers differ on the number and names of these stages. Emig delineated seven: pre-writing (from the awareness of stimuli in the environment to the first words put on paper); planning (a setting of parameters); starting; composing; reformulation (correcting, revising, or rewriting); stopping; contemplating the product.(1) However, a simpler model designed by Gordon Rohman is more commonly used: pre-writing, writing, and re-writing.(2)

2. The composing process is reflexive.

Though the writing process may be segmented for discussion purposes, it is in fact reflexive and non-linear. That is, the stages overlap, and may occur and recur at any point. Both Sondra Perl (3) and Sharon Pianko (4) have documented these

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facts in their studies of writers at the college level. Perl (5) has termed this reflexivity "shuttling," where the writer works backward as well as forward, returning to "substrands" of the writing process in order to compose additional material. Nancy Sommers (6) has also stressed the non-linearity of the composing process in her studies of revision: rewriting can and does occur at any point in the writing process.

3. The composing process may be mastered by means of strategies.

Experienced writers have a range of techniques, or strategies, to assist them in planning, writing and revising their rough drafts. Therefore, their composing processes are well-developed and effective. Sharon Crowley (7) has stressed this latter fact in her comparison of inexperienced and experienced writers. Inexperienced writers do not pre-plan; they also tend to write their products straight through and revise little beyond changes in mechanics. Experienced writers, on the other hand, have well-defined composing processes.

In their studies of problem-solving, Linda Flower and John Hayes (8) have concentrated specifically on writers' strategies, which provide alternative discovery procedures to the trial-and-error methods inexperienced writers frequently use. Flower and Hayes have discovered that good writers constantly redefine their audience and assignment while composing. They also consider their goals, how they wish to affect this audience. Flower (9) has then delineated techniques which these successful writers use to "solve" the problem of composing.

Collecting the Data

Our second step was to collect data on the way technical writers compose, and relate our findings to these three areas of agreement. We used questionnaires and interviews to gather information from a broad sample, surveying seventy writers in all:

technical writing students, students working part-time in industry, university professors, and engineers and researchers working full-time in industry. The disciplines represented by these seventy writers included civil, chemical, agricultural, geological, mechanical, electrical and petroleum engineering, chemistry, hydrology, geology and biology. The writers working full or part-time in industry were employed by firms producing hardware, firms performing consulting services and firms performing research. No technical editors or professional writers were surveyed, only technicians, engineers, and researchers whose jobs involved composing reports.

Interpreting the Results

Our third step was to interpret the results of our survey in terms of the areas of agreement delineated above.

1. The Composing Process is Made Up of Several Stages.

Our study shows that the technical writer does have a composing process of several stages, similar to that of other writers.

We have used Rohman's model to discuss these stages: pre-writing, writing, re-writing. Of the technical writers surveyed, all seventy indicated that they engaged in some form of distinctly pre-writing and re-writing activity, in addition to their writing stages. The amount of time spent in all three stages and their distinct separation varied greatly, however, and depended on two factors: the projected length of the document being written and the form of that document.

If the writer knew that the final product would be long, ten pages or more, he or she spent more time on pre-writing and re-writing activities and separated the stages of the composing process more distinctly. On the other hand, if the writer knew that the final product would be short, he or she spent less time on the stages and also distinguished among them less sharply.

For example, one experienced writer said that, when composing a short letter, he often thought for a minute or two, mentally noting the main points to be covered and perhaps "came up" with a full sentence to be used in the draft. His pre-writing stage, then, was very brief and tended to merge with the writing itself. After composing the letter, his re-writing activity consisted only of reading through the secretary's typed draft. When preparing a lengthy proposal, however, this same writer had pre-writing and re-writing stages which were divided into several sub-stages and were clearly separated from composing the first draft of the document.

The second factor, form, particularly affected the length of the pre-writing and re-writing stages. If the form were flexible (e.g., the journal article or the proposal), more activity took place in these stages. If the form were highly structured (e.g., the progress report), less activity took place.

2. The Composing Process is Reflexive.

The composing process of technical writers is reflexive and non-linear, as is that of other writers. We found several indications of this reflexivity.

First, as Emig (10) has discussed for others, the writing stage itself is a time of generation for technical writers too. Virtually all writers surveyed indicated that they frequently discovered and added information while composing--content which they had not intended to use and perhaps had not fully articulated. In fact, one chemical engineering professor said he always wrote the conclusion section of a paper or journal article last because he was never sure until he had composed other sections precisely what he wished to conclude, despite finishing his technical work and constructing extensive pre-writing plans. This generative aspect of the writing stage, which involved selecting content and setting parameters for the product--traditionally two pre-writing activities--illustrates the reflexive nature of the composing process: pre-writing acts recur in the writing stage.

Second, pre-writing plans reappear as criteria guiding the re-writing stage. The seventy writers surveyed all performed traditional revisionary activities of adding, rearranging, substituting and deleting material, both during and after composing. Their criteria in terms of content were completeness and proper emphasis of the data, and their procedure was most often a testing process where the writer compared the information included in the draft with the needs of the audience and the purpose of the document. Audience and purpose, as we will discuss, are two primary considerations in the pre-writing stage, which reappear as aids in re-writing.

In addition, all seventy writers said they examined their drafts for logical progression. When checking for logical progression, only a few writers said they referred directly to ordering techniques, another primary component of the pre-writing stage. However, this examining activity itself indicates the internalization of those ordering techniques and another recurrence of pre-writing aids as criteria for re-writing. Thus these writers engage in the process Perl has called "shuttling," again an indication of reflexivity in composing.

Third, writing and re-writing merge with editing, which also ends the writing process. For most writers surveyed, the re-writing of long documents in particular had several sub-stages: the document was examined as a whole and revised; it was examined section by section or paragraph by paragraph and revised; it was examined sentence by sentence and revised. These actions, however, could occur at any point in the composing process. For example, one writer said he frequently reread a previous paragraph or even the entire piece he had composed to date before continuing to write. He then added, reordered, substituted and deleted material and performed editorial operations while composing; his first draft was frequently his last. This merging of writing, re-writing and editing again reveals the reflexive nature of the composing process.

However, editing also ends that process. Although the writers surveyed did not clearly delineate the content or the succession of the sub-stages involved in re-writing, most indicated that they corrected grammar and usage in the sentence-by-sentence reading.

3. The Composing Process May be Mastered by Means of Strategies.

Our survey indicates that the most experienced technical writers have a range of strategies which they use at each stage in the composing process, to help them master writing.

Pre-Writing. We have classified strategies used in the pre-writing stage into two groups: first-order and second-order. First-order strategies apply to composing in general, regardless of the specific communication situation giving rise to the document. These first-order strategies include analyzing the audience, analyzing the purpose of the document, and consulting the "classic" forms of technical writing. Second-order strategies apply to the "classic" form once it has been chosen, and include the use of an ordering device to structure the material.

Only the least experienced writers did not reflect on who would read the document and what its purpose was before beginning to compose. The most experienced writers considered these questions, as well as the form they would select. This first-order strategy, however, was frequently implied rather than consciously articulated. For example, writers would discuss the major and minor emphases of a document or refer to the "parts" they intended to include in a specific report, indicating in this way a consideration of form.

All seventy writers except one used some type of written technique to order the material they had gathered for their communication tasks. For most, this written technique was an outline though the degree of formality and complexity varied. For example, the most experienced writers began by listing ideas for

inclusion in the draft, after which they sought logical relationships among items in the lists and shaped them into more formal outlines. Virtually all the writers said they then used these outlines as guides in the writing stage. In fact, one interviewee's outline was often so complete he would simply write it out in continuous sentences as his rough draft.

Writers did not, however, limit themselves to one organizational pattern in this pre-writing stage. Instead they often considered several patterns before deciding on a final form. Two such writers mentioned making three or four different outlines in a given reporting situation, then choosing the most effective among them.

Although the list, expanded to an outline, was the most common ordering device used, writers also mentioned utilizing diagrams when describing systems, or a combination of diagrams and flow charts when describing processes, indicating the form-specific nature of this second-order strategy.

The pre-writing stage we have delineated resembles that described in the literature. However, the technical writer's pre-writing stage does differ from the pre-writing stages of other writers in one significant way: generation of material. Researchers on the composing process frequently emphasize searching for new knowledge (11), "inventing" content (12), or choosing a topic (13) as the writer's first pre-writing step. Thus strategies for invention are important pre-writing aids.

None of our interviewees considered searching for or inventing knowledge or choosing a topic in pre-writing or anywhere else in the composing process. Instead, most viewed pre-writing as a time to select and organize material collected prior to the communication task in their technical inquiry. This difference is probably due to what James Souther has called the "situational" (14)

nature of most technical writing, where the writer is assigned a topic or one is dictated by an organizational problem he or she has explored, an exploration which also provides the content for composing.

Because the technical writers interviewed generally do not face the problems of generating content or delineating a specific topic and intent from a broader subject area, their pre-writing stages were more deliberate than that described in the literature. Again, the technical writer's pre-writing steps involve setting parameters for a specific communication task: selecting and ordering content rather than generating it. These activities give the stage its deliberate cast, which is also reflected in the specific strategies used to order: the list and the outline. Technical writers find these strategies useful because of the nature of technical forms, which tend to be more prescriptive than forms used in other writing situations and structured on logical rather than associative or emotional principles.

Re-Writing. Strategies used in the re-writing stage are all first-order because they apply regardless of the specific communication situation. This re-writing can and does occur throughout the composing process and proceeds on three levels: content, form and style.

In terms of content, technical writers return to their audience and purpose analyses as checks when revising for inclusiveness and proper emphasis of content.

In terms of form, technical writers tend to revise from larger units to smaller, solving major structural problems before proceeding to the paragraph or sentence level. Logical progression of the draft is the major criterion guiding this revision, which proceeds by checking the actual pre-writing outline or more frequently an internalization of that outline.

In terms of style, technical writers make stylistic changes during composing, often after considering audience needs, but they also edit when the draft is complete.

The re-writing stage we have delineated also tends to be more deliberate than that of other writers described in the literature. The technical writer's audience, purpose and form are set by his or her technical task. The parameters guiding the technical writer's revision are thus more clearly defined than is the case with other writers. The technical writer's major criteria for revision--inclusiveness and proper emphasis of the contents of the draft, and logical progression--can be met because the revisionary task itself is clearer.

Defining the Implications

The seventy technical writers we surveyed all engage in a composing process similar to that of other writers, with strategies to master it at each point. The differences we found do not concern the process itself, but the deliberate cast or character of the stages and the well-defined nature of the strategies used.

We feel that this information has several important pedagogical implications:

1. Composing as process ought to be taught.

In addition to the data we have presented, we have found that most experienced technical writers understand the nature of composing: the process involved and the steps used. Our students must also understand composing as process if they are to write well.

2. Strategies to master writing ought to be delineated.

The successful technical writers we surveyed have a range of writing strategies at their disposal. Our students must also be given these tools, in order to master composing.

3. The distinctive nature of the technical writer's composing process and writing strategies ought to be presented.

Technical composition does differ from composing in other fields, as our study indicates. The composing process is more deliberate and strategies more clearly defined: audience, purpose and form guide planning, writing and revising. The situational nature of writing also influences composing. These distinctions help define the nature of technical writing, and thus they too ought to be taught.

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